

WHAT IS CLAIMED IS:

1. A method for bonding or joining thermoplastic or thermoset polymeric materials comprising:

(a) applying a layer of conductive material between two thermoplastic or thermoset polymeric surfaces to be bonded or formed into a joint;

(b) introducing a voltage to the conductive material so as to cause the surfaces of the polymeric material to heat to a temperature above their melting point and maintaining said voltage until such time as the surfaces of the polymeric materials become molten and a bond or joint forms between the surfaces; and

(c) removing said voltage and allowing the bonded thermoplastic materials to cool to a temperature below their melting point so as to solidify said bond or joint.

2. The method of claim 1 wherein the two polymeric surfaces are clamped together before the introduction of a voltage.

3. The method of claim 2 wherein the two polymeric surfaces are clamped using either mechanical pressure or by evacuation to create a vacuum pressure at the interface between the two surfaces.

4. The method of claim 1 wherein the conductive material comprises a conductive carbon fiber in the form of a sheet or voile.

5. The method of claim 1 wherein the conductive material comprises a conductive ink or paint.

6. The method of claim 5 wherein the conductive ink or paint is applied to at least one of the two polymeric surfaces to be bonded or formed into a joint.

7. The method of claim 5 wherein the conductive ink or paint is applied using standard screen printing techniques.

5           8. The method of claim 1 wherein the thermoplastic or thermoset polymeric materials are selected from the group consisting of polyethylene, polypropylene and other polyolefins, polyethylene terephthalate and other polyesters; polyamides; polyimides; polystyrene and other vinyl polymers, nylon, ABS and PC-ABS.

10           9. The method of claim 4 wherein the carbon voile has an approximate density of less than 10 grams per square meter.

15           10. The method of claim 1 wherein a metallic conductive tape or wire is applied along the opposite sides or ends of the conductive material for the purpose of applying an electrical current across the conductive material.

            11. The method of claim 10 wherein the conductive tape or wire is removed following the bonding or joint forming process.

20           12. The method of claim 1 wherein the voltage is applied for 10 seconds or less.

            13. A thermoplastic or thermoset polymeric material having a joint or bond formed by the method of claim 1.

25           14. A method for bending a thermoplastic or thermoset polymeric material comprising:

            (a) applying a layer of conductive material to thermoplastic or thermoset polymeric material;

(b) introducing a voltage to the conductive material so as to cause the surface of the polymeric material to heat to a temperature above its melting point and form a bendable portion in the thermoplastic or thermoset polymeric material;

(c) bending said polymeric material to a desired angle; and

5 (d) removing said voltage after said desired bending angle is achieved to allow the thermoplastic or thermoset polymeric material to harden at the desired angle.

10 15. The method of claim 14 wherein the polymeric material is in the form of a sheet.

16. A method for heating a thermoplastic or thermoset polymeric material comprising:

15 (a) applying a layer of conductive material to thermoplastic or thermoset polymeric material;

(b) introducing a voltage to the conductive material so as to cause the surface of the polymeric material to heat to a temperature above its melting point; and

20 (c) removing said voltage after heating is no longer desired.

17. The method of claim 16 wherein the polymeric material is in the form of a pipe or a planter.

25 18. The method of claim 16 wherein the polymeric material is in the form of a wall radiator.